Welcome to the Sediment Remediation Technology Database.

Please select from one of the remedial technology classes below:


212847

DREDGING

CAPPING

IN-SITU REMEDIATION

MONITORED NATURAL RECOVERY

DREDGING

CONTAINMENT

FINAL
DISPOSITION

DELIVERY

DECONTAMINATION

DREDGING

DEWATERING

TRANSPORTATION

WATER
TREATMENT

AIR/ODOR
CONTROL

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Design Considerations

Potential Vendors

SPECIALTY

DREDGING

HYDRAULIC

MECHANICAL

Design Considerations

Potential Vendors

Design Considerations

Potential Vendors

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Mechanical Dredging – Design Considerations

- Ability to Dredge Sediment Type Present
- Production Rate
- Disposal Method
- Size/Draft
- Dredging Depth
- Dredging Schedule
- Positioning Accuracy
- Resuspension Control Measures
- Debris Removal Methods

< Back

Mechanical Dredging – Potential Vendors

- Cable Arm
- Bean Environmental
- Caterpillar
- Great Lakes Dredge and Dock Co.
- IHC Holland
- Ballast Ham Dredging
- Dredging Supply Company
- Dredge Technology Corporation
- Royal Boskalis Westminster N.V.
- Conbar International
- Ellicott
- Dredging International/DEME
- Sevenson Environmental Services

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Specialty Dredging – Design Considerations

- Ability to Dredge Sediment Type Present
- Production Rate
- Disposal Method
- Size/Draft
- Maneuverability
- Dredging Schedule
- Positioning Accuracy
- Resuspension Control Measures
- Debris Removal Methods

< Back

Specialty Dredging – Potential Vendors

- Normrock Industries
- Seaway Environmental Technologies
- Pneuma SRL
- Bean Environmental
- IHC Holland
- Dredging Supply Company
- Dredge Technology Corporation
- Conbar International
- Ellicott
- Eddy Pump Corporation
- Sevenson Environmental Services

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Hydraulic Dredging – Design Considerations

- Ability to Dredge Sediment Type Present
- Production Rate
- Disposal Method
- Size/Draft
- Pumping Requirements
- Dredging Schedule
- Positioning Accuracy
- Resuspension Control Measures
- Debris Removal Methods

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Hydraulic Dredging – Potential Vendors

- Bean Environmental
- Great Lakes Dredge and Dock Co.
- IHC Holland
- Ballast Ham Dredging
- Dredging Supply Company
- Dredge Technology Corporation
- Royal Boskalis Westminster N.V.
- Conbar International
- Ellicott
- Dredging International/DEME

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Design Considerations

Potential Vendors

SHEET PILE

Design Considerations

Design Considerations

Potential Vendors

SILT BARRIER

SILT CURTAIN

Potential Vendors

CONTAINMENT

JERSEY BARRIERS/ DIKES/PORTADAMS

CONTROL ZONE

Design Considerations

Potential Vendors

Design Considerations

Potential Vendors

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Jersey Barriers/Dikes/Portadams – Design Considerations

- Depth
- Impact on River Current
- Long-term Effectiveness
- Impact on Navigation
- Bottom Conditions
- Degree of Permanence

< Back

Jersey Barriers/Dikes/Portadams– Potential Vendors

Jersey barriers and dikes are conventional structures that can be constructed by most contractors. Similar proprietary products are marketed by:

- Portadam Co.

- Sunshine Supplies

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Sheet Pile – Design Considerations

- Dewatering Needs
- Impact on River Current
- Site Access
- Driving Methods
- Bottom Conditions
- Strength (esp. with dewatering)
- Sealing System
- Water Depth

< Back

Sheet Pile – Potential Vendors

Sheet pile is a readily available, industry standard method for containing a work area. However, depending on site characteristics and design considerations, it is possible that a higher degree of water containment may be necessary than standard techniques would allow. Proprietary systems that may be able to achieve a higher degree of water containment include:

- Waterloo Barrier, Inc.

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Silt Barriers – Design Considerations

- Level of Resuspension Reduction Desired
- Impact on River Current
- Anchoring and Flotation
- Impact on Navigation
- Bottom Conditions
- Mesh Size
- Depth

< Back

Silt Barriers – Potential Vendors

- Gunderboom
- OMS Environmental
- Boom Environmental Products
- Terrafix Geosynthetics, Inc.
- Envirosmart
- Bowhead Manufacturing Co.
- American Boom & Barrier Co.
- Brockton Equipment/Spilldam

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Silt Curtains – Design Considerations

- Level of Resuspension Reduction Desired
- Impact on River Current
- Anchoring and Flotation
- Impact on Navigation
- Bottom Conditions
- Mesh Size
- Depth

< Back

Silt Curtains – Potential Vendors

- Gunderboom
- OMS Environmental
- Boom Environmental Products
- Terrafix Geosynthetics, Inc.
- Envirosmart
- Bowhead Manufacturing Co.
- American Boom & Barrier Co.
- Brockton Equipment/Spilldam
- Elastec American Marine

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Control Zone – Design Considerations

Control Zone technology utilizes mobile sectional barges and movable sheet piles to create an enclosed pen in which dredging can occur.

- Configuration of Sectional Barges
- Impact on River Current
- Number of Sectional Barges/Containment Vessels
- Desired Cycle Time
- Bottom Conditions
- Depth of Piles

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Control Zone – Potential Vendors

- Seaway Environmental Technologies

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Design Considerations

Potential Vendors

BARGE

DELIVERY

HYDRAULIC

Design Considerations

Potential Vendors

< Back

Hydraulic – Potential Vendors

- Toyo Pumps
- Caterpillar
- Hagler Systems
- KLM, Inc.
- Pearce Pump South, Inc.

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Hydraulic – Design Considerations

- Pumping Distance
- Slurry Density
- Treatment Needs
- Site Access
- Need for Booster Pumps
- Pumping Rate
- Percent Solids Range
- Particle Size
- Friction Losses
- Unloading System
- Pump Type

< Back

Barge – Potential Vendors

- List vendors here

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Barge – Design Considerations

- Distance
- Destination
- Disposal Options
- Community Sentiment
- Size
- Unloading Method

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Design Considerations

Potential Vendors

DESSICATION

Design Considerations

Potential Vendors

MECHANICAL

DEWATERING

GEOSYNTHETIC BAGS

Design Considerations

Potential Vendors

GRAVITY SETTLING

Design Considerations

Potential Vendors

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Gravity Settling – Design Considerations

- Assisted/Unassisted
- Size of Settling Basin
- Time Required for Settling
- Solids Content (Influent/Effluent)
- Contaminant Emission Control
- Bench Testing

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Gravity Settling – Potential Vendors

- List vendors here

< Back

Mechanical – Design Considerations

- Capacity
- Capability
- Residuals
- Grain Cut/Vortex Size
- Power Requirements
- Pressure Range
- Solids Content (Influent/Effluent)
- Results of Bench Testing
- Contaminant Emission Control

< Back

Mechanical – Potential Vendors

- US Filter
- Powerscreen

< Back

Dessication – Design Considerations

- Disposal Method
- Solids Content (Influent/Effluent)
- Contaminant Emission Control
- Results of Bench Testing

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Dessication – Potential Vendors

- List vendors here

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Geosynthetic Bags – Design Considerations

- Bag Dimensions
- Mesh Size
- Water Treatment Needs
- Solids Content (Influent/Effluent)
- Contaminant Emission Control
- Results of Bench Testing

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Geosynthetic Bags – Potential Vendors

- Geotec Associates
- Geo-Synthetics Inc.
- Turner Specialty Services
- ACF Environmental, Inc.

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Design Considerations

Potential Vendors

FILTRATION

Design Considerations

Design Considerations

Potential Vendors

GAC

MEMBRANES

Potential Vendors

WATER TREATMENT

COAGULATION/ FLOCULATION/SETTLING

AIR STRIPPING

Design Considerations

Potential Vendors

Design Considerations

Potential Vendors

< Back

Coagulation/Floculation/Settling– Design Considerations

- Capacity to Treat Contaminant Concentrations Present
- Assisted/Unassisted
- Size of Settling Basin
- Time Required for Settling
- Solids Content (Influent/Effluent)
- Contaminant Emission Control
- Results of Bench Testing

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Coagulation/Floculation/Settling – Potential Vendors

- CIBA Specialty Chemicals
- QEMI
- Dow

< Back

Filtration – Design Considerations

- Capacity to Treat Contaminant Concentrations Present
- Solids Content (Influent/Effluent)
- Metals Present
- Contaminant Emission Control
- Results of Bench Testing

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Filtration – Potential Vendors

- US Filter

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Granular Activated Carbon (GAC)– Design Considerations

- Capacity to Treat Contaminant Concentrations Present
- Flux
- Solids Content (Influent/Effluent)
- Residuals
- Results of Bench Testing

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Granular Activated Carbon (GAC) – Potential Vendors

- Calgon Carbon Corporation
- Carbtrol

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Membranes – Design Considerations

- Capacity to Treat Contaminant Concentrations Present
- Flux
- Orifice Size
- Solids Content (Influent/Effluent)
- Treatment Effectiveness
- Results of Bench Testing

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Membranes – Potential Vendors

- Pall Corporation

< Back

Air Stripping – Design Considerations

- Capacity to Treat Contaminant Concentrations Present
- Stripper Configuration
- Effluent Limits
- Size

< Back

Air Stripping – Potential Vendors

- North East Environmental Products

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Design Considerations

Potential Vendors

LIME

Design Considerations

Potential Vendors

CONTAINMENT

AIR/ODOR CONTROL

CARBON

Design Considerations

Potential Vendors

CHEMICAL SCRUBBERS

Design Considerations

Potential Vendors

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Lime – Design Considerations

- Results of Bench Testing

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Lime – Potential Vendors

- Chemical Lime Corporation

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Chemical Scrubbers – Design Considerations

- Results of Bench Testing

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Chemical Scrubbers – Potential Vendors

- List Vendors Here

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Containment – Design Considerations

- Results of Bench Testing

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Containment – Potential Vendors

- List vendors here

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Granular Activated Carbon (GAC) – Design Considerations

- Results of Bench Testing

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Granular Activated Carbon (GAC) – Potential Vendors

- Calgon Carbon Corporation
- Carbtrol

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Design Considerations

Potential Vendors

BARGE

TRANSPORTATION

RAIL

Design Considerations

Potential Vendors

TRUCK

Design Considerations

Potential Vendors

< Back

Rail – Design Considerations

- Transportation Distance
- Destination
- Disposal Options
- Community Sentiment
- Size
- Cycle Time
- Rail Car Seals

< Back

Rail – Potential Vendors

The applicability and availability of rail as a transportation method will depend upon the identification of railroads near the site of the dredging project.

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Truck – Design Considerations

- Transportation Distance
- Destination
- Disposal Options
- Community Sentiment
- On/Off-Road Requirements
- Size
- Cycle Time
- Seals

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Truck – Potential Vendors

Trucks are a common, industry standard transportation method which can be procured from a variety of contractors.

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Barge – Design Considerations

- Distance
- Destination
- Disposal Options
- Community Sentiment
- Size
- Unloading Method

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Barge – Potential Vendors

- List vendors here

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Design Considerations

Potential Vendors

THERMAL

DECONTAMINATION

SOIL WASHING

STABILIZATION/ SOLIDIFICATION

Design Considerations

Potential Vendors

Design Considerations

Potential Vendors

< Back

Soil Washing – Design Considerations

- Results of Bench Testing
- Throughput
- Treatment Effectiveness

< Back

Soil Washing – Potential Vendors

- BioGenesis
- ART Engineering, LLC
- BioTrol

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Stabilization/Solidification – Design Considerations

- Results of Bench Testing
- Throughput
- Treatment Effectiveness

< Back

Stabilization/Solidification – Potential Vendors

- Hart Crowser
- Geo-Con, Inc.
- Kelchner

< Back

Thermal – Design Considerations

- Results of Bench Testing
- Throughput
- Treatment Effectiveness

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Thermal – Potential Vendors

- Minergy
- Gas Technology Institute
- Upcycle Associates
- Innova Soil Technology
- Recycling Science International, Inc.
- Astec Industries

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Design Considerations | Potential Vendors | Design Considerations | Potential Vendors

CONFINED DISPOSAL FACILITY (CDF)

LANDFILL

FINAL DISPOSITION

BENEFICIAL USE

OPEN WATER DISPOSAL

Design Considerations | Potential Vendors | Design Considerations | Potential Vendors

< Back

Confined Disposal Facility (CDF) – Design Considerations

- Pretreatment Requirements/Contaminant Concentrations
- Transportation Distance
- Ability to Contain Materials
- Availability of CAD Cells
- Available Area Either Nearshore or Upland
- Size/Depth

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Confined Disposal Facility (CDF) – Potential Vendors

The applicability and availability of Confined Disposal Facilities as a final disposition will depend upon the identification of area in which dredged material can be placed.

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Landfill – Design Considerations

- Pretreatment Requirements/Contaminant Concentrations
- Transportation Distance
- Location
- Permit Requirements
- Volume

< Back

Landfill – Potential Vendors

The applicability and availability of Landfills as a final disposition will depend upon the identification of landfills in which dredged material can be placed.

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Open Water Disposal – Design Considerations

- Pretreatment Requirements/Contaminant Concentrations
- Transportation Distance
- Testing Requirements
- Modeling Needs

< Back

Open Water Disposal – Potential Vendors

The applicability and availability of Open Water Disposal as a final disposition will depend upon the nature and extent of contamination present.

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Beneficial Use – Design Considerations

- Pretreatment Requirements/Contaminant Concentrations
- Transportation Distance
- Application/Usage
- Desired Geotechnical Properties
- Transportation Methods

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Beneficial Use – Potential Vendors

The applicability and availability of Beneficial Use as a final disposition will depend upon the identification of opportunities in which dredged material can be used. Potential uses include daily cover for landfills, mine reclamation, wetlands restoration, and engineered products (i.e. masonry units, etc.).

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APPLICATION

CAPPING

MATERIALS

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MATERIALS

Design Considerations

Potential Vendors

Design Considerations

UPLAND BORROW

ACTIVE CAPS

Potential Vendors

Potential Vendors

GEOSYNTHETIC MATERIALS

Design Considerations

SUBAQUEOUS BORROW

Design Considerations

ENGINEERING CLAY AGGREGATE

Potential Vendors

Potential Vendors

Design Considerations

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Subaqueous Borrow – Design Considerations

Materials from subaqueous borrow are sediments that are dredged and can come from an uncontaminated area in the site or from near-by dredging projects.

- Desired Sediment Characteristics
- Cap Thickness
- Volume of Sediments Required to Construct Cap
- Layering of Sediments
- Compatibility with Bottom Conditions
- Compatibility with Habitat
- Availability

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Subaqueous Borrow – Potential Vendors

- List vendors here

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Upland Borrow – Design Considerations

Upland borrow material comes from a source that has not been submerged under water previously. Materials could be from quarries or reused beneficial use material.

- Desired Sediment Characteristics
- Cap Thickness
- Volume of Sediments Required to Construct Cap
- Layering of Sediments
- Compatibility with Bottom Conditions
- Compatibility with Habitat
- Proximity to Site
- Availability

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Upland Borrow – Potential Vendors

- List vendors here

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Active Caps – Design Considerations

Active Caps incorporate reactive additives into capping material which encourage reactions to take place that has the potential to reduce contamination. Additives that have been used or are being researched include: activated carbon, apatite, coke, organoclay, zero-valent iron, and zeolite.

- Capacity to Treat Contaminant Concentrations Present
- Flux
- Compatibility with Bottom Conditions
- Compatibility with Habitat
- Cap Thickness/ Compression
- By Products of Activity (*e.g.*, gas bubbles)
- Settling Velocity

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Active Caps – Potential Vendors

Activated Carbon

- Calgon Carbon Corporation

- Carbtrol

Apatite

- Contact Jeffery Milton or Kevin Gardner of the University of New Hampshire

Coke

- Mid Continent Coal and Coke (US Steel (PW))

OrganoClay Sorbent

- Hart-Crowser owner of Biomin EC-100

Zero-Valent Iron

- Peerless Metal Powders and Abrasives

Zeolite

- List Vendors

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Engineering Clay Aggregate– Design Considerations

Engineered Clay Aggregate controls seepage and advective contaminant transport. It consists of a gravel/rock core covered by a clay layer that expands in water decreasing its permeability.

- Layering of Sediments
- Compatibility with Bottom Conditions
- Compatibility with Habitat
- Application Technology

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Engineering Clay Aggregate– Potential Vendors

- AquaBlok

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Geosynthetic Materials – Design Considerations

Geosynthetic materials consist of both membranes and textiles. Both are synthetically made, however, membranes are designed to be impermeable. Geosynthetics are commonly used in addition to other materials for a multiple layer cap.

- Application Method
- Anchoring
- Compatibility with Current/Wave Climate
- Compatibility with Bottom Conditions
- Compatibility with Habitat
- Type of Geosynthetic Material

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Geosynthetic Materials – Potential Vendors

- **ACF**
- **Colorado Lining**

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APPLICATION

TREMIE

Design Considerations

Potential Vendors

Potential Vendors

Potential Vendors

BUCKET

Design Considerations

SURFACE DISCHARGE SCOW

Design Considerations

DIVER PLACEMENT

Potential Vendors

Design Considerations

PNEUMATIC SPRAYER

Potential Vendors

Design Considerations

FLOATING CONVEYOR

Potential Vendors

Design Considerations

PIPELINE SPREADER BARGE

Design Considerations

Potential Vendors

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R2-0002827

Diver Placement – Design Considerations

Diver placement application technology utilizes the assistance of an underwater diver to accurately place capping material or the diver can verify that cap design depths and extents have been adequately met. Placement of resuspension control measures can also be diver assisted.

- Number of Divers
- Production Rate
- Compatibility with Current/Wave Climate
- Diver Exposure to Contaminants
- Resuspension Control Measures
- Capping Material Characteristics
- Thickness of Cap

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Diver Placement – Potential Vendors

- Appledore Engineering, Inc.
- M and N Services
- Industrial Divers
- Childs Engineering
- Aqua-Terra Maritime Inc.

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Floating Conveyors – Design Considerations

Floating conveyor application technology is incorporated onto a barge or land based operation in order to mechanically feed capping material to the spreading equipment or onto a barge.

- Flotation
- Compatibility with Current/Wave Climate
- Application Method
- Size/Draft
- Resuspension Control Measures
- Production Rate
- Capping Material Characteristics

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Floating Conveyors – Potential Vendors

- Rohr Corporation
- Ellicott
- IHC Holland
- Vulcan Materials

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Pipeline Spreader Barge – Design Considerations

Pipeline spreader barge application technologies utilize a hydraulic subsurface pipeline to place material. Different technologies can be used at the end of the pipeline such as a diffuser, baffle, or sand box to dissipate the energy that a hydraulic pipeline can induce.

- Compatibility with Cap Material
- Depth of Spreader Extension
- Typical Currents/Flood Flows
- Size/Draft
- Resuspension Control Measures
- Production Rate
- Capping Material Characteristics
- Size of Area to be Capped

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Pipeline Spreader Barge– Potential Vendors

- Ellicott

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Pneumatic Sprayer – Design Considerations

Pneumatic sprayer application technology utilizes compressed gas to spread cap material in a relatively uniform and controlled manner.

- Compatibility with Cap Material
- Range of Spray
- Typical Currents/Flood Flows
- Size/Draft
- Resuspension Control Measures
- Production Rate

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Pneumatic Sprayer – Potential Vendors

- List vendors here

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Surface Discharge Scow – Design Considerations

Surface discharge scow application technology releases capping material from the waters surface using bottom-dump barges. Provisions are made for controlled opening or movement of the barges.

- Size/Draft
- Post-Capping Water Depth Requirements
- Typical Currents/Flood Flows
- Wave Climate
- Resuspension Control Measures
- Production Rate
- Size of Area to be Capped
- Capping Material Characteristics
- Release Control of Capping Material

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Surface Discharge Scow – Potential Vendors

As standard pieces of equipment for dredging operations, scows are likely to be available from any major dredging contractor.

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Tremie – Design Considerations

Tremie application technology consists of a large-diameter conduit extending vertically from the surface through the water column to some point near or above the bottom.

- Conveyance Method
- Depth of Tremie
- Circumference of Tremie
- Size/Draft
- Resuspension Control Measures
- Production Rate
- Typical Currents and Waves Forces

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Tremie – Potential Vendors

- Gerwick
- Star Iron Works
- Superchute

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Bucket – Design Considerations

Bucket application technology utilizes a bucket excavator that descends into the water and discharges capping material. The bucket excavator may be either land based or mounted onto a barge.

- Proximity to Shore
- Barge Mounting Method
- Bucket Depth
- Bucket Positioning Accuracy
- Resuspension Control Measures
- Depth to Bottom
- Production Rate
- Capping Material Characteristics

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Bucket – Potential Vendors

- Cable Arm
- Bean Environmental
- Caterpillar
- Great Lakes Dredge and Dock Co.
- IHC Holland
- Ballast Ham Dredging
- Dredging Supply Company
- Dredge Technology Corporation
- Royal Boskalis Westminster N.V.
- Conbar International
- Ellicott
- Dredging International/DEME
- Sevenson Environmental Services

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BIOLOGICAL

IN-SITU REMEDIATION

PHYSICAL

CHEMICAL

< Back

PHYSICAL

STABILIZATION/ SOLIDIFICATION

Design Considerations

Potential Vendors

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Stabilization/Solidification – Design Considerations

Stabilization/Solidification in-situ technology allows sediments that are susceptible to erosion and redeposition to remain in place and are less likely to be redistributed during high flow and flood events.

- Results of Bench Testing
- Throughput
- Treatment Effectiveness

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Stabilization/Solidification – Potential Vendors

- Entact, Inc.

(1360 North Wood Dale Road Suite A Wood Dale, Illinois 60191 USA http://www.entact.com)

- Hart Crowser

(1910 Fairview Avenue East Seattle, Washington 98102 USA http://www.hartcrowser.com)

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Design Considerations | Potential Vendors

REDUCTION:
ZERO VALENT IRON

Design Considerations | Potential Vendors

OXIDATION:
FENTON'S REAGENT

CHEMICAL

Design Considerations | Potential Vendors

OXIDATION:
PERSULFATE

Design Considerations | Potential Vendors

OXIDATION:
PERMANGANATE

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Oxidation: Permanganate – Design Considerations

In Situ Chemical Oxidation (ISCO) involves injecting chemical oxidants into the vadose zone and/or ground water to oxidize contaminants. For permanganate application, a 1% to 5% solution is prepared on site from potassium permanganate crystals that are delivered in bulk to the site.
(http://www.cpeo.org/techtree/ttdescript/isco.htm (03-16-05))

- Size of treatment area
- pH
- Oxidant Delivery Rates
- Aquifer Properties
- Effects on contaminants

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Oxidation: Permanganate – Potential Vendors

- ISOTEC - In Situ Oxidative Technologies, Inc.

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Oxidation: Persulfate – Design Considerations

In Situ Chemical Oxidation (ISCO) involves injecting chemical oxidants into the vadose zone and/or ground water to oxidize contaminants. Persulfate anion ($S_2O_8^{2-}$) can be thermally or chemically activated to produce a powerful oxidant known as the sulfate free radical (SO_4-) with a standard redox potential of 2.6V, which is capable of destroying groundwater contaminants.

•Size of treatment area

• pH

• Oxidant Delivery Rates

• Aquifer Properties

• Effects on contaminants

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Oxidation: Persulfate – Potential Vendors

- ISOTEC - In Situ Oxidative Technologies, Inc.

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Reduction: Zero Valent Iron – Design Considerations

In Situ Chemical Reduction with zero valent iron involves injecting the zero valent iron into the vadose zone and/or ground water to reduce contaminants.

- Size of treatment area
- pH
- Oxidant Delivery Rates
- Aquifer Properties
- Effects on contaminants

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Reduction: Zero Valent Iron – Potential Vendors

- ARS Technologies
- Peerless Metal Powders and Abrasives

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Oxidation: Fenton's Reagent – Design Considerations

In Situ Chemical Oxidation (ISCO) involves injecting chemical oxidants into the vadose zone and/or ground water to oxidize contaminants. Fenton's reagent is produced on site by adding an iron catalyst to a hydrogen peroxide solution. (http://enviro.nfesc.navy.mil/erb/restoration/technologies/remed/phys_chem/phc-43.asp (03-16-05))

- Size of treatment area
- pH
- Oxidant Delivery Rates
- Aquifer Properties
- Effects on contaminants

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Oxidation: Fenton's Reagent – Potential Vendors

- ISOTEC - In Situ Oxidative Technologies, Inc.

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Design Considerations

Potential Vendors

BIOSTIMULATION

BIOLOGICAL

PHYTOREMEDIATION

Design Considerations

Potential Vendors

BIOAUGMENTATION

Design Considerations

Potential Vendors

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Phytoremediation – Design Considerations

Phytoremediation technology utilizes the natural properties of plants in engineered systems to remediate contaminated areas.

- Type of contaminants that require remediation
- Depth and areal extent of contamination
- Sediment type and properties
- Oxygen availability
- Nutrients
- Presence of substances toxic to plants

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Phytoremediation – Potential Vendors

- Applied PhytoGenetics, Inc
- Phytokinetics, Inc.

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Bioaugmentation – Design Considerations

Bioaugmentation a highly concentrated and specialized population of specific microbes that are known or believed to biodegrade certain contaminants.

- Potential to leach

- Chemical reactivity (e.g., tendency toward nonbiological reactions, such as hydrolysis, oxidation, and polymerization)

- Biodegradability of contaminants

- Depth and areal extent of contamination

- Sediment type and properties

- Oxygen availability

- Nutrients

- Presence of substances toxic to the microbes

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Bioaugmentation – Potential Vendors

- Oppenheimer Biotechnology, Inc.

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Biostimulation – Design Considerations

Biostimulation modifies the environment to enhance the growth of indigenous microbes which have the potential to breakdown contaminants.

•Potential to leach

• Chemical reactivity (e.g., tendency toward nonbiological reactions, such as hydrolysis, oxidation, and polymerization)

• Biodegradability of contaminants

• Depth and areal extent of contamination

• Sediment type and properties

• Oxygen availability

• Nutrients

• Presence of substances toxic to the micobes

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Biostimulation – Potential Vendors

- Applied Research Associates, Inc.

- Envirovison, Inc.

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Monitored Natural Recovery

Monitored Natural Recovery (MNR) is a remedial class that contains naturally occurring processes to contain, destroy, and/or reduce the bioavailability of contaminated sediment. These processes may be chemical, physical, or biological in nature, and may include:

- Natural burial by deposition
- Immobilization by sorption of contaminants to sediment matrix
- Surface concentration reduction by mixing with cleaner sediment
- Conversion to a less toxic form by biodegradative processes

Any remedy that implements MNR should involve a monitoring program and a contingency plan. Modeling may also be required in order to determine the level of risk reduction and necessary timeframe to be expected.

Advantages of MNR include its low implementation cost and minimally invasive nature. However, MNR is limited by its extended timeframe, and sediments left in place may pose an increased risk in the future.

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